

SPECIFICATION

TITLE: HEAVY CABLE CRIMPING BLOCK

This Application is a Continuation-In-Part of Application Serial No. 10/457,031, filed June 5, 2003, and Continuation-In-Part of Application Serial No. 29/177,340, filed March 6, 2003.

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to tools for crimping connectors on cables and more particularly relates to a heavy-duty crimping blocks for crimping connectors on heavy cables.

2. Background Information

There are a wide variety of crimping tools for crimping terminals, lugs, and connectors on wires or cables and for splicing cables. Cables are comprised of an assembly of conductive strands which are twisted to form a core and have an insulating coating. In some cases several twisted cores may be combined to form heavy-duty cables. Such heavy-duty cables find their use where large currents are present such as in aircraft and other equipment that draw heavy currents.

Crimping tools can be used to crimp and connect to an end of cable or can be used for crimpable cable splice connectors to join adjacent ends of cables. Crimping means the connector has a crimpable end forming a socket to receive the end of the cable. The crimping tool then applies substantial pressure to

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1 the socket end of the connector. The crimping tool mashes the
2 socket end of the connector on the cable until it tightly fits
3 around the cable holding the connector firmly joining the end of
4 the connector to the end of the cable.

5 One problem with present splicers is they are not suitable
6 for use in small cramped spaces. Some of them have a pair of
7 handles pivotally connected to a pair of jaws. Opening and
8 closing the handles applies a force to the crimping portion of
9 the jaws to crimp a connector on the end of a cable. Further a
10 very large force is required to crimp these cable connectors on
11 heavy-duty cables. These types of crimping tools are unsuitable
12 for small spaces such as under the hoods of aircraft. Other
13 type of crimping tools employ an adjustable handle and a
14 crimping pin movable towards an anvil for crushing the cable
15 connector and the end of the cable between the anvil and the
16 crimping end.

17 However these devices are not found to be suitable for use
18 in the small or closely confined spaces such as under the hood
19 of an aircraft engine.

20 It is therefore one object of the present invention to
21 provide crimping blocks that is small enough and simple enough
22 to use in confined spaces such as under the hood of an aircraft
23 engine.

24 Yet another object of the present invention is to provide a
25 crimping tool for crimping connectors on heavy-duty cable that

1 is adaptable to a variety of different cable sizes.

2 Yet another object of the present invention is to provide a
3 heavy-duty cable crimping blocks that can easily provide a
4 substantial force on the end of a connector crushing it firmly
5 and tightly around the end of a heavy-duty cable.

6 Still another object of the present invention is to provide
7 a heavy-duty cable crimping block in which substantial force can
8 be applied to crush a connector around the end of a cable by
9 bolts in opposite ends of crimping blocks that when tightened
10 down crush the connector against the end of the cable.

11 Yet another object of the present invention is to provide
12 heavy-duty cable crimping blocks having one blocks with a
13 plurality of crimping troughs or grooves for receiving the end
14 of a cable and a second block mating with the first block having
15 a plurality of ribs with the plateaus that engage the troughs to
16 crush a connector onto the end of a cable.

17 Still another object of the present invention is to provide
18 heavy-duty cable crimping blocks having a first base crimping
19 block with a plurality of ribs and an upper crimping block that
20 has additional crimping troughs on an upper surface allowing the
21 upper crimping block to be reversed.

22 Still another object of the present invention is applied to
23 heavy-duty cable crimping block having a removable handle that
24 can be attached to either end of the cable crimping blocks.

25 BRIEF DESCRIPTION OF THE INVENTION

1 This invention relates to crimping devices for crimping
2 connectors on cables and more particularly relates to crimping
3 blocks for crimping connectors on heavy-duty cables.

4 Connectors or terminals are connected to wires and cables
5 by fitting them on the end of a wire or cable and then crimping
6 connector to firmly and tightly secure it to the end of a cable.
7 A socket on the terminal or splicing connector is placed over
8 the end of the cable which is first cut square and the
9 insulation stripped an amount approximately equal to about the
10 socket depth. The end of the cable is inserted in the terminal
11 socket and then placed in a crimping tool having a groove or
12 notch sometimes referred to as an anvil. The crimping tool
13 having a pin with a surface that will engage the groove is then
14 closed crushing the socket on the terminal tightly around the
15 end of the cable.

16 In the present invention the crimping device is comprised
17 of a base block having a plurality of ribs or ridges spaced
18 apart across the width of the block. These ribs have plateaus
19 forming flat crushing surfaces for crimping a connector socket
20 on the end of a heavy-duty cable.

21 A second upper block is constructed to mate with the base
22 block and has plurality of crosswise troughs or notches. The
23 troughs are spaced apart on an undersurface of the upper
24 crimping block. Preferably there are a plurality of these
25 troughs of different sizes. Each trough is sized to have a

1 radius that is equal to the radius of a selected standard gage
2 cable. In the embodiment disclosed herein, there are four
3 equally spaced troughs to match four different gage cables. The
4 upper cable crimping block has troughs spaced so that the ridges
5 on the base block intercept each groove approximately at its
6 center when the crimping tool is closed.

7 To crimp a connector onto the socket on a connector or
8 terminal, a stripped end of a heavy-duty cable is first inserted
9 in the connector or terminal socket and placed in one of the
10 appropriately sized troughs of the upper crimping block. The
11 base crimping block and upper crimping block are then drawn
12 together by bolts passing through the upper crimping block into
13 threaded holes in respective ends of the base crimping block
14 until the crimping tool is closed. This draws the plateau on
15 the crimping ribs of the base block up against the connector
16 mounted on the cable crushing the connector socket against the
17 groove in the upper crimping block tightly squeezing and
18 crimping the connector on the end of the cable.

19 An optional preferred feature of the invention is the
20 inclusion of a plurality of troughs on an upper surface of the
21 upper crimping block to increase the range of cables that can be
22 crimped with the tool. Preferably in the upper surface of the
23 upper crimping block, there are four additional crimping troughs
24 each sized to a particular diameter cable. That is, the radius
25 of the grooves is approximately equal to a particular radius or

1 gage of cable. This provides up to eight different sized cables
2 that can be suitably mounted and crimped in the crimping block.
3 To use the upper crimping block troughs in the upper surface,
4 the upper crimping block is reversed on the lower crimping block
5 so that the crimping ribs in the lower crimping block engage the
6 grooves as described previously. Crimping is accomplished also
7 as described hereinabove.

8 Still another option of the present invention is to provide
9 a handle for the tool that allows the tool to be easily held
10 while a connector is being crimped on a cable. The crimping
11 tool can be used with or without the handle. If there is
12 sufficient space, the handle may be mounted by a threaded bolt
13 shaft which engages a threaded hole in the end of one of the
14 base or upper crimping blocks. Preferably the threaded socket
15 is in the upper crimping block which is generally larger than
16 the lower crimping block. Also to allow the flexibility of
17 using the tool from either end, a second socket is provided in
18 the opposite end of upper crimping block so that the tool may be
19 reversed.

20 The above and other objects, advantages, and novel features
21 of the invention will be more fully understood from the
22 following detailed description and the accompanying drawings, in
23 which:

24 BRIEF DESCRIPTION OF THE DRAWINGS

25 Figure 1 is an isometric view of a crimping device

constructed according to the invention.

Figure 2 is a side elevation of the crimping device of Figure 1.

Figure 3 is an end view of the crimping device of Figure 3.

Figure 4 is a top view of the crimping device.

Figure 5 is a bottom view of the crimping device.

Figure 6 is an isometric view of the crimping tool with the upper crimping block reversed to accommodate additional size or gage of cables.

Figure 7 is an isometric view of an optional embodiment which includes a handle for manipulating the crimping tool.

Figure 8 is an isometric view illustrating use of the crimping device of Figure 7 with a handle.

Figure 9 is an isometric view of the crimping device illustrating use with a clamping tool.

DETAILED DESCRIPTION OF THE INVENTION

A crimping block device 10 constructed according to the invention is shown in the isometric view of Figure 1. Crimping device 10 is comprised of upper crimping block 12 and base crimping block 14. Hex-head bolts 16 on each end of crimping block device 10 extend through bores 17 in upper crimping block 12 into threaded bores 18 in each respective end of base crimping block 14. Bores 17 at each end of upper crimping block 12 could be straight through bores but also could be threaded if desired to retain bolts 16 when base crimping block 14 is

1 separated from upper crimping block 12. Preferably bores 17 in
2 each end of upper crimping block 12 are larger than the diameter
3 of threaded shaft 20 of bolt 16 to allow the reversal of upper
4 crimping block 12 to be easily and quickly made.

5 Preferably bores 17 in each end of upper crimping block 12
6 are larger than the threaded shaft 12 on bolts 16 so that they
7 pass easily through the upper crimping block 12 into the
8 threaded bore 18 in base crimping block 14. Optionally bores 17
9 in upper crimping block 10 could be threaded for the purpose of
10 retaining bolt 16 when upper crimping block 12 is separated from
11 base crimping block 14 as described previously.

12 The construction of upper crimping block 12 and base
13 crimping block 14 is illustrated in Figures 2 through 5. Base
14 crimping block 14 is rectangular in shape and has a plurality of
15 ribs 22 each having a flat surface or plateau 24 for engaging
16 and crushing or crimping the connector of a terminal or a
17 splicing connector. Each rib 22 across the width of base block
18 14 has a plateau or flat surface 24 crushing the connector when
19 the upper crimping block 12 is closed on the lower crimping
20 block as will be described hereinafter. Both upper crimping
21 block 12 and base crimping block 14 are preferably made from
22 steel.

23 Upper crimping block 12 is approximately the same
24 rectangular shape as base crimping block 14 and has a plurality
25 of troughs 26, 27, 28, 29, 30, 31, 32, and 33 that are

1 preferably in the shape of arcuate semi-circular grooves for
2 receiving the end of a cable inserted in a socket of a terminal
3 or a splicing connector. Optionally the troughs 27 through 33
4 could be other shapes such as V-shaped if desired. Upper
5 crimping block 12 when positioned above base block 14 has axis
6 of each trough approximately centered over plateaus 24 on ribs
7 22. Thus when upper crimping block 12 is closed down on base
8 crimping block 14, plateaus 24 of ribs 22 intersect each trough.
9 Preferably ribs 22 have a height that is only slightly less than
10 the depth of each of the troughs 26, 28, 30, 32, 34, 36, 38, and
11 40. Each rib 22 can be of the same height or can be constructed
12 to match the size or depth of each trough 26 through 33.

13 The unique feature of the crimping block tool 10 is that it
14 is adaptable to various size cables by varying the size of
15 troughs 26 through 33 and making upper crimping block 12
16 reversible. That is, by unscrewing bolt 16 allowing upper
17 crimping block 12 to be separated from base crimping block 14,
18 it can be reversed and the crimping troughs 30 through 33 used.
19 Further while crimping troughs 26 through 33 are shown as random
20 in Figure 2, they could be consecutive with each crimping trough
21 slightly increasing in size either from left to right or from
22 right to left. Also preferably each trough would have a marking
23 adjacent to trough indicating the preferred size of cable the
24 trough is to be used for.

25 As was described previously, crimping troughs 26 through 33

1 are all slightly different in size to accommodate different size
2 cables. As shown, troughs 26 vary in size from approximately
3 1/4 of an inch to 1/2 an inch while troughs 30 through 33 vary
4 in size from approximately 3/8 to 3/4 of an inch. Troughs 26
5 through 33 could also be at metric sizes if desired. Troughs 26
6 through 33 while shown as semi-circular could be different
7 shapes such as oval, V-shaped, etc. Also as stated previously,
8 ribs or ridges 22 can vary in height according to the respective
9 trough 22 through 33 they are to engage. Thus while ribs 22 are
10 shown at equal height in Figure 2, they could be of varying
11 height if desired.

12 Figure 6 illustrates the crimping block tool 10 of Figure 1
13 with the upper crimping block 12 reversed. Also, each crimping
14 trough 26 through 33 is approximately semi-circular and has a
15 radius approximately equal to the radius of the cable to which
16 the terminal or connector is being spliced. Markings (not
17 shown) are preferably provided by engraving or some other
18 suitable means on the upper crimping block adjacent each trough
19 30 through 33 indicating the correct trough to use for the
20 particularly size cable being crimped.

21 An alternate but preferred embodiment includes a handle 36
22 as illustrated in Figure 7. For this purpose upper crimping
23 block 12 is slightly longer than base crimping block 14 to
24 accommodate threaded bores 38 and 40 at each end. Handle 36
25 made of any suitable material such as wood or metal has a

1 threaded shaft 42 that threads into threaded bores 38 through 40
2 on either end of upper crimping block 12. Where space is not at
3 a premium, handle 36 can be used with the crimping device in the
4 field. Further in some "tight quarters" where space is at a
5 premium, handle 36 may easily be removed by unscrewing shaft 42
6 from bore 38 or 40.

7 It should also be noted that upper crimping block 12 of
8 Figure 7 is longer than base crimping block 14. This results in
9 flat areas 13 on each side of both ends of upper crimping block
10 12. Flats 13 provide a gripping surface for use in some
11 situations when handle may not be convenient as will be
12 described in greater detail hereinafter.

13 One method of using crimping block tool 10 is illustrated
14 in Figure 1. A cable 44 is cut to length and insulation
15 stripped off a short portion on the end equal to approximately
16 the depth of a socket on the end of terminal or connector 46.
17 Cable 44 is then inserted into the socket on the end of terminal
18 46 and the assembly placed in the appropriate trough 26 through
19 33 in crimping device 10. Preferably the connector in the end
20 of connector socket and the end of cable 14 are centered in one
21 of the crimping troughs such as crimping top 26. Bolts 16 are
22 then tightened down to force plateau 24 of the first rib 22 into
23 trough or semi-circular groove 26 until the connector socket is
24 crushed around the end of cable 44. This results in connector
25 46 being securely fastened to the strip end of cable 44.

1 The use of crimping block 10 with handle 36 is illustrated
2 in Figure 8. A cable 44 with a lug 46 is seated in the
3 appropriate trough 29 according to the size of gage of cable 44.
4 Handle 36 is attached to upper crimping block 12 by screwing
5 threaded shaft 42 into aperture 38, preferably at the end
6 farthest from cable 44 to gain the greatest leverage if
7 possible. While handle 36 is held by hand 39, a tool 41 such as
8 a ratchet wrench, or any other suitable tool for gripping bolt
9 head 16 is rotated by the other hand 43 to draw crimping tool 10
10 closed securely crimping lug 46 on cable 44. Of course handle
11 36 can be attached to either end of upper crimping block 12 and
12 depends upon where the tool is being used and how much space is
13 available.

14 An alternative method of using crimping block 10 is
15 illustrated in Figure 9. Elongated upper crimping block 12 with
16 flats 13 allow either end to be held by a clamp such as clamping
17 tool 45 known as a vise grip while an open end wrench is used on
18 bolt head 16. Cable 44 with lug 46 is first positioned in the
19 appropriate trough 26 while clamping tool is locked on flats 13
20 furthestmost from cable 44 to obtain the greatest leverage.
21 While clamping tool 45 is shown clamping flats 13 and extending
22 outward along the length of crimping block 10, it can of course
23 be clamped at any angle on flats 13 on either end of upper
24 crimping block 12. It can be from parallel as shown or
25 perpendicular or at any angle in between. Bolts 20 at each end

1 would be tightened down until lug 46 is crushed securely
2 fastening it to an end of cable 44.

3 It should also be noted that flats 13 on both sides of
4 either end of upper crimping block 12 are of sufficient length
5 that the crimping tool can be held by a hand 39 without the use
6 of handle 36 or clamping tool 45. This arrangement will allow
7 the tool to still be used in cramped or tight spaces where
8 handle 36 or clamping tool 45 would not fit.

9 Thus there has been described a simple to construct and
10 easy to use crimping block device that can be used to crimp
11 terminals or splice connectors on the ends of a cable. The
12 crimping block tool is simple in design and small enough to be
13 used in very tight spaces such as under the hood of an aircraft
14 or other areas where the usual crimping tools having long
15 handles or complex mechanism may not be used. This tool is
16 simply and easy to use by placing the connector on the cable
17 fitting it to the proper crimping trough and closing the tool by
18 cranking bolts 16 down until upper crimping block 12 is pressed
19 down on base crimping block 14. This allows crimping ribs 22 to
20 severely and securely crush or crimp the connector socket onto
21 the end of a cable.

22 This invention is not to be limited by the embodiment shown
23 in the drawings and described in the description which is given
24 by way of example and not of limitation, but only in accordance
25 with the scope of the appended claims.